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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/771,047	02/02/2004	Kalin Sparious	PD-02W202	1523
7590 01/21/2010				
John E. Gunther Raytheon Company P.O. Box 902 (E1/E150) El Segundo, CA 90245-0902			EXAMINER NGUYEN, PHILLIP	
			ART UNIT 2828	PAPER NUMBER
			MAIL DATE 01/21/2010	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/771,047

Applicant(s)

SPARIOSU ET AL.

Examiner

PHILLIP NGUYEN

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,5-8,10,11,13,16,17,20-29,31-40 and 43-45 is/are pending in the application.
- 4a) Of the above claim(s) 10,11 and 13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5-8,16,17,20-29,31-40 and 43-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-940)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1, 5-8, 16-17, 20-24, 26-28 have been considered but are moot in view of the new ground(s) of rejection.

However, applicant fails to address the rejections of claims 29, 31-40, and 43-45. Therefore the rejections are maintained.

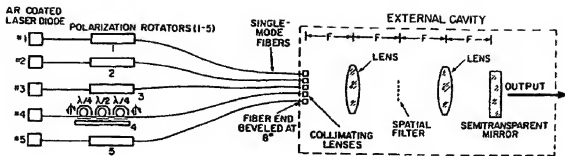
Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 5-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Corcoran and Rediker (Operation of five individual diode lasers as a coherent ... Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran").



With respect to claim 1, Corcoran discloses in Fig. 1 (above) a laser system comprising:

a plurality of laser fibers (single mode fibers);

a high power pump source (#1, #2, ...#5) coupled to each of said laser fibers; and

an external cavity (EXTERNAL CAVITY) having an optical axis, and beam-flattening optics (collimating lenses) for flattening individual Gaussian-like TEM₀₀ beams into top hat laser beams and forming a combined beam symbolized by a random phase and amplitude multiple beam profile, said external cavity having a first lens (left lens), a single aperture (spatial filter), a second lens (right lens), and a mirror (semitransparent mirror) located at focal points of the first and second lenses.

It's noted that although Corcoran does not explicitly disclose the beam flattening optics for flattening individual Gaussian-like TEM₀₀ beams into top hat laser beams and forming a combined beam symbolized by a random phase and amplitude multiple beam profile, it is inherent that beam flattening optics such as collimating lenses are capable of producing top hat beams.

With respect to claim 5, in Fig. 1, references #1, #2... #5 is noted as AR coated laser diode.

With respect to claim 6, the laser diodes #1 to #5 are either end-coupled via pigtails (direct coupling) or discrete imaging optics (with focusing lenses).

With respect to claim 7, Corcoran discloses the pump sources #1, #2, ...#5 are either side coupled/edge coupled, fusion coupled, and/or via reflective cavity.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent ... Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Waarts et al. (US 6298187). Corcoran discloses the claimed invention except for the laser fibers with differing lengths differ in length from one another by more than 1.5 centimeters. Waarts discloses fibers with different lengths by at least 1.5 cm to form different wavelengths (col. 11, lines 27-38). It would have been obvious to one skill in the art at the time the invention was made to provide fibers with different lengths by at least 1.5 cm as taught by Waarts to provide different wavelengths.

6. Claims 16-17, 20-24, 26-28, are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent ... Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Craig et al. (US 6356574).

With respect to claims 16-17, Corcoran discloses the claimed invention except for a Bragg reflectors integrated in the laser fiber. Craig discloses in Fig. 1 Bragg reflectors 18A/18B integrated in the laser fiber 18. It would have been obvious to one skill in the art at the time the invention was made to provide the Bragg reflectors 14 as taught by Craig in order to provide an optical feedback stabilize wavelength (col. 16, lines 17-23).

With respect to claim 20, although the references do not teach the beam flattening optics being characterized by hexagonal geometry, it is well known in the art to use hexagonal geometry of optics to save space and reduce the lost of laser intensity.

With respect to claim 21, Corcoran discloses the plural sources including diodes as mentioned earlier.

With respect to claims 23-24, Craig discloses a plurality of fibers 18 including integrated DBR 18A/18B in order to provide optical feedback and wavelength stabilization (col. 16, lines 17-23) with each pump source 15 including at least one diode and a diode emitter array for each of said plurality of laser fibers in order to achieve high pump power output from amplifiers 18 (col. 7, lines 59-67).

With respect to claims 26-27, Craig discloses in Fig. 4 clad end pumping configuration including discrete imaging optics for imaging output beams from each diode emitter array to each laser fiber.

With respect to claim 28, Craig further discloses the diode emitter array is adapted to transmit at wavelength of approximately 1.5 microns (col. 1, lines 51-54). The particular wavelength of the pump sources is corresponding to a particular laser output from the doped fiber. Therefore it is well known to select a particular wavelength pump source to produce a particular desired laser output wavelength from the fiber amplifier.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent ... Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Craig et al. (US 6356574) and further in view of Feillens et al. (US 20040246570). Corcoran and Craig discloses the claimed invention except for the laser fibers being Er:YAG laser fibers. Feillens discloses a fiber laser shown in Fig. 8 using Er:YAG fiber. It would have been obvious to one skilled in the art at the time the invention was made to apply Er:YAG fiber as taught by Feillens to Corcoran in order to produce a desired wavelength.

Claims 29, 31-33 and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent ... Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Jiang et al. (US 6982997).

With respect to claim 29, Corcoran discloses in Fig. 1 a beam phase-locking system comprising: a first means for receiving plural single-mode beams of electromagnetic energy and

providing flat-top beams as output in response thereto (the fibers and collimating lenses); and second means for combining said flat-top beams via spatial filtering (spatial filter and lenses) and providing a collimated combined beam in response thereto; and said spatial filter including beam flattening optics (collimating lenses) and first and second collimating lenses and a single aperture of predetermined diameter therebetween, and a mirror (semitransparent mirror), the aperture being located at the focal points of the first and second collimating lenses. However, Corcoran does not explicitly teach Bragg reflectors integrated in the laser fibers. Jiang discloses in Fig. 1 Bragg reflectors 14 integrated in the laser fiber 18. It would have been obvious to one skill in the art at the time the invention was made to provide the Bragg reflectors 14 as taught by Jiang in order to provide a feedback necessary to sustain the laser operation in the external cavity (col. 3, ln. 27-31).

With respect to claim 31, see the rejection of claims 16-17.

With respect to claim 32, the cladding is normally made by dielectric surrounding the cores of the fibers. It would have been obvious to one skill in the art at the time the invention was made to provide a dielectric cladding for the fiber.

With respect to claim 33, since Corcoran does not mention if the fibers having different length, it is believed that the lengths of the fibers are approximately equivalent.

With respect to claim 36, Corcoran and Jiang disclose the claimed invention except for explicitly teaching the diode emitter array is adapted to transmit at wavelength of approximately 1.5 microns. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide claimed Er molecular concentration, since it has been held that

discovering an optimum value of a result effective variable involves only routine skill in the art.
In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With respect to claims 37-38, Corcoran discloses means for pumping said fiber laser oscillator (laser diodes).

With respect to claims 39-40, the claims recite means for pumping including one or more pigtail couplers or discrete imaging optics. It is well known to use either pigtail or lens to couple pump sources to fibers in order to reduce loss due to the divergence of laser beams from pump sources.

With respect to claim 43, Corcoran discloses in the Fig. 1 that the mirror is semitransparent which is considered partially transmissive and being positioned adjacent to the second collimating lens.

With respect to claim 44, Corcoran further discloses the first means includes beam flattening optics positioned between the first collimating lens and the pump sources. It would have obvious to include the beam flattening optics located between the grating and the first collimating lens since the grating should be integrated in the fiber.

Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent ... Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Jiang et al. (US 6982997) in view of Hough (US 20040042085). Corcoran and Jiang disclose the claimed invention except for the beam flattening optics being characterized by hexagonal geometry. Hough on the other hand discloses hexagonal lenslets in order to reduce or avoid 10% loss of light intensity (paragraph 0029). It would have been obvious at the time the invention was made to provide the beam

flattening optics characterized by hexagonal geometry as taught by Hough to Corcoran and Jiang.

Claims 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent ... Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Jiang et al. (US 6982997) further in view Waarts et al. (US 6298187). Corcoran and Jiang disclose the claimed invention except for the laser fibers with differing lengths differ in length from one another by more than 1.5 centimeters. Waarts discloses fibers with different lengths by at least 1.5 cm to form different wavelengths (col. 11, lines 27-38). It would have been obvious to one skill in the art at the time the invention was made to provide fibers with different lengths by at least 1.5 cm as taught by Waarts to provide desired output wavelengths.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Communication Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip Nguyen whose telephone number is 571-272-1947. The examiner can normally be reached on 9:00 AM - 6:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MINSUN HARVEY, can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Phillip Nguyen/

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/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828